**Principles of Screening**

**Framework:**

* **Introduction**
* **What is screening?**
* **Describe elements of screening**
* **Types of screening**
* **What is Sensitivity?**
* **What is Specificity?**
* **What are Positive &Negative predictive value?**

**Introduction:**

The control of disease should be achievable , either by preventing the disease from occurring, if it does occur ,by curing those who develop it with appropriate treatment.

At present, neither prevention nor treatment is completely successful for most diseases. They will continue to complement each other while, for a number of conditions, another approach to control may prove to be appropriate &complementary to one or both of the approaches. Such an approach is Screening.

**What is screening?**

“The presumptive identification of unrecognized disease or defect by the application of tests, examinations or other procedures that can be applied rapidly”

**Principles of screening***☹(*Wilson and Junger,1968)

1. The condition sought to be an important health problem

2. There should be an accepted treatment for patients with recognized disease

3. Facilities for diagnosis & treatment should be available

4. There should be a recognizable latent or early symptomatic stage

5. There should be suitable test or examination

6.The test should be acceptable to the population

7. The natural history of disease, from the latent phase to declared disease, should be adequaltely understood

8.There should be an agreed policy on whom to treat as patients

9.The cost of case findings(including diagnosis and treatment of patients diagnosed)should be economically balanced in relation to possible expenditure on medical care as a whole

10. Case finding should be a continuing process and a once for all activity.

**Criteria for assessing screening test☹Cochrane &Holland 1971)**

**1. Simplicity:** a test should be simple to perform, easy to interpret, and where possible ,capable of use by paramedical and other personnel

**2. Acceptibility:** since participation is voluntary , a test must be acceptable to those undergoing it

**3.Accuracy:**a test must give true measurement of the condition or symptom under investigation

**4. Cost :**the expense of the test must be considered in relation to the benefits of early detection of disease

**5. Precision or repeatability :**the test should give consistent results in repeated trials

**6.Sensitivity:** the test should be capable of giving a positive finding when the person being screened has the disease being sought

**7.Specificity:** the test should be capable of giving a negative finding when the person being does not have the disease being sought

**Benefits of Screening:**

1. Improved prognosis for some cases detected by screening

2. Less radical treatment which cures some early cases

3. Reassurance for those with negative tests results

**Types of screening**

**1. Mass screening**: Screening of a whole population or subgroup like screening of all adults .It is offered to all irrespective of the particular risk individual may run of contracting the disease

**2. High risk or selective screening:** By epidemiological research certain high risk groups are defined like cancer cervix is seen more common in lower social groups compared to upper social groups.

Diabetes. Hypertension, breast cancer tend to occur in families so screening of other members of family and close relatives can detect additional cases

**3. Multiphasic screening**:Application of two or more screening tests in combination to a large number of people at one time than to carry out separate screening tests for single diseases

This includes health questionnaire, clinical, examination, measurements &investigations like chemical &hematological tests on blood &urine specimens. Lung function tests, audiometry, visual acuity

**Disadvantages of Screening:**

1.Longer morbidity from cases whose prognosis is unaltered

2.Overtreatmant of questionable abnormalities

3.False reassurance for those with false-negative results

4.Anxiety and sometimes morbidity for those with false-positive results

5.Unnecessary medical intervention for those with false-positive results

6.Hazard of screening test, e.g venepuncture, radiation

7.Resource costs: diversion of scarce resources to screening programme

**What is Sensitivity?**

**“**It is the ability of the test to detect all those with the disease in the screened population”

This is expressed as the proportion of those with the disease in whom a screening test gives a positive result

**What is Specificity?**

**“**It is the ability of test to identify correctly those free of the disease in the screened population”

This is expressed as the proportion of people free of the disease in whom the screening test gives a negative result

|  |  |
| --- | --- |
| **Disease** | |
|  | | **Present** | **Absent** |
| **Test** | **Positive** | **A** | **B** |
| **Negative** | **C** | **D** |

**Sensitivity**:=Proportion with condition who test positive

**a/a+c**

**Specificity=**Proportion with condition who test negative

**d/b+d**

**Predictive Values:** The probability of disease ,given the results of a test is called the predictive value of the test

**Positive predictive value:** It is the probability of disease in apatient with a positive (abnormal) test result.

**Negative predictive value:** It is the probability of not having the disease when the test result is negative(normal)

|  |  |  |
| --- | --- | --- |
| **Disease** | | **Total** |
|  | | | **Present** | **Absent** |  |
| **Test** | **Positive** | | **A** | **b** | **a+b** |
| **Negative** | | **C** | **d** | **C+d** |
| **Total** | | **a+c** | | **b+d** | **a+b+c+d** |

**True positive(a):**Those individuals found positive on the test who have the condition or disorder being studied

**False positive(b):** Those individuals who have a positive test result who do not have the disease

**False negative (c):**Those with negative test results but who have the disease

**True negative(d):** Those with negative test results but do not have the disease

**Positive predictive value=a/a+b**

**Negative predictive value=d/d+c**

**Organizing a screening programme:**

1. Identify the target population.

2. Ensure a high coverage and uptake rate

3. Ensure adequate facilities for screening & interpretation of the screen material

4. Ensure adequate quality control both within &between centres for the screening procedures& its interpretation

5. Establish an agreed referral system

6. Ensure a reliable fail-safe procedure to ensure that action is taken on all positive results

7. Ensure adequate facilities for the diagnosis and appropriate treatment of screen detected disease, and for the follow up of treated individuals

8. Ensure systematic evaluation and monitoring of whole programme

9. Ensure adequate training for all key personnel.